

REMARKS

The present invention provides an economical and efficient light diffusing element for a low heat type illuminator such as LEDs and similar components that are now being utilized to take advantage of the relatively long life and low energy requirements.

As known in this field, a light emitting diode can include an encapsulating resin cover which can provide a certain directional emission of light. The present invention addresses the light and the manner of its emission in order to diffuse it and to provide a relatively even illuminance or soft light.

Utilization of conventional diffusers can limit the transmission efficiency and increase the cost of any resulting lamp. Additionally, there is a desire to have a relatively compact configuration that can be easily assembled while optimizing the desired illuminance from the structure.

As can be appreciated, a large number of relatively sophisticated companies have attempted to address this issue. The patentability of the improvements of our present invention should be taken in view of the crowded nature of this field.

“Thus when differences that may appear technologically minor nonetheless have a practical impact, particularly in a crowded field, the decision-maker must consider the obviousness of the new structure in this light.”

Continental Can Co. USA Inc. v. Monsanto Co., 20 U.S.P.Q. 2d. 1746, 1752 (Fed. Cir. 1991).

Referring to Figure 1, the embodiment of the present invention is disclosed having an illuminator 2 mounted in a cylindrical intermediate element 3b of a surrounding traverse reflection surface positioned adjacent the LED 2 and bordered by a cylindrical side surface of a diffusion reflection surface, for example of barium sulphate or Teflon®. The exterior surface of

the intermediate element 3b can be threaded. A lens holding groove 8 can support a spherical lens 7 wherein light, extending along the optical axis, can be further supplemented with reflected and diffused light. A spherical lens can be positioned within a through hole and be optically aligned with the axis of the LED and a leading end element 3a can be threaded into an intermediate cylindrical element 3b to capture and hold the spherical lens 7 within the lens holding groove 8. The resulting illuminance has been found to be highly desirable as shown in Figure 3.

The present claims have been amended consistent with the description and our drawings and are believed to adequately distinguish over any one or more of the cited references.

Claims 1 and 7 were rejected as being completely anticipated by *Obara et al.* (Japanese Laid-Open Application 08-106260).

Obara et al. strived to provide basically a flat plate diffuser primarily using a saw tooth pattern linearly extending across an illumination field of an LED. A large number of different configurations, primarily of the saw tooth pattern in a linear or even a curvilinear (Figure 3) embodiment is disclosed.

The Office Action further had rejected Claims 1-4 and 8 over *Takahashi et al.* (Japanese Laid-Open Application 2003-186427).

The *Takahashi et al.* reference was concerned with the directivity of light from an LED and utilized a lamp housing of a partial cone shape with a side wall 26 roughened to provide a scattering reflective surface. The LED device 23 was further covered by a gently concave bend with an under surface transparent material that was attached to a planar base 27b. Diffusion film is then provided on the surface of the base 28.

In essence, the transparent material 27 is a light guide of a cone shape with a scattering reflection surface formed on the inner wall of the light source case 25 and not on the peripheral side of the light guide 27. There is no through hole nor cylindrical portion with a diffusion part. There is also no teaching of a lens for providing appropriate refraction in the manner defined in our claims.

Claims 5 and 9 were rejected as being obvious over a combination of the *Takahashi et al.* reference when taken further in view of *Kato et al.* (Japanese Laid-Open Application 10-039175). The Office Action relied upon the *Kato et al.* reference for purposes of disclosing a cylindrical shape.

Actually, the *Kato et al.* disclosure teaches a highly polished reflective or mirror plane 4 of the ellipse cylinder 3. Presumably, the alignment of the LED in the configuration of an ellipse is to help provide a parallelization of the emitted light for entrance into fiber optical fibers 5 mounted in the front of the ellipse cylinder 3.

In essence, the *Kato et al.* reference would teach an attempt to direct a high portion of the emitted light into relatively parallel light rays to minimize the number of reflective surfaces to ensure that a substantial amount of the light is directed into the appropriate optical fibers 5.

Claim 6 was further rejected as being obvious over the *Takahashi et al.* disclosure in view of Japanese Laid-Open Application 63-80402.

The Office Action referred to Figure 3 for purportedly the provision of a reflection surface opposite a light exit direction. Figure 3 discloses a cross-sectional view of an LED encapsulated within a half cylinder elongated lens. A diffusion luminaire having apparently a peripheral edge of a saw tooth configuration and a central edge of a longitudinal groove 14

assisted in providing direction to the light within the cone of light from the LED defined by a housing 20.

It is respectfully submitted that the present invention as set forth in our claims is not obvious over a combination of the basic *Takahashi et al.* disclosure when taken in view of either the *Kato et al.* or the Japanese Laid-Open Application 6380402.

The light diffusing element of the present invention is for a lighting apparatus which irradiates a distant light irradiation area with high illumination evenness. The apparatus disclosed in *Takahashi et al.* irradiates a display near the light source and cannot irradiate a distant light irradiation area with a high illumination evenness.

Further, transmissive type diffusers require additional large diameter lenses to decrease a loss of light and condense light on a predetermined light irradiation area. However, with the light diffusing element of the present invention, light emitted from the illuminator that is parallel or nearly parallel to the optical axis passes directly through a passage part to reach the light irradiation area with little loss, thus permitting achieving a significant improvement in efficiency compared to the conventional apparatus, which diffuses all of the light. In addition, our passage part is required to be provided with, for example, a hole, and the diffusion part is also just required to have a diffuse reflection surface and a transmission diffusion member formed around the hole, thus achieving a simple and economical configuration. Moreover, due to light control by the diffusion part, excellent controllability of the illuminance distribution in the light irradiation area is provided. Further, the controllability is not disturbed even when the illuminator is located close thereto, thus permitting greater downsizing compared to a conventional structure.

With the light diffusing element of the present invention, by specifying the shape and size of the diffuse reflection surface permits easy adaptation to the required shape and illuminance distribution characteristics of the light irradiation area, which is also excellent in the controllability of irradiation light. Thus, for existing various illuminators arbitrarily selected by the user, irradiation light can easily be controlled in accordance with characteristics thereof, thus providing an easy to use light diffusing element with little limitation in the compatibility of its combination with an illuminator.

It is the Examiner's burden to establish *prima facie* obviousness. See *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993) Obviousness requires a suggestion of all the elements in a claim (*CFMT, Inc. v. Yieldup Int'l Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003)) and "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). Here, we find that the Examiner has not identified all the elements of claim 1, nor provided a reason that would have prompted the skilled worker to have arranged them in the manner necessary to reach the claimed invention.

Ex parte Karoleen B. Alexander, No. 2007-2698, slip op. at 6 (B.P.A.I. Nov. 30, 2007)

It is believed that the submission of the new claims sets forth elements that even based on any hypothetical combination of the references of record, would not be obvious to a person of skill in this field.

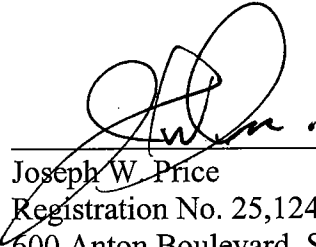
Additionally, it is believed that the present claims would require a person of ordinary skill and common sense in this specific field to appreciate the diverse references that have been cited would not be combined except as an aggregate in hindsight from the present application disclosure and only by disregarding the teaching and purpose of these individual references.

It is believed that the present claims are patentable and an early notice of allowance is requested.

If the Examiner believes a telephone interview will assist in the prosecution of this case, the undersigned attorney can be contacted at the listed phone number.

Very truly yours,

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